

What is claimed is:

1. An apparatus for applying light to a site to be treated on a wall of a vessel in the human or animal body, comprising:

- a light-feeding instrument designed to guide light generated by an extracorporal light source to said site and to radiate said light onto said site;
- said light-feeding instrument comprising
- an elongated light guide that can be inserted into said vessel and can be displaced therein in a longitudinal direction of said vessel; and
- light-deflecting means designed to direct said light fed through said light guide in a substantially radial direction onto said site to be treated.

2. The apparatus of claim 1, wherein said light guide is straight at a distal end so that said light emerges substantially axially from said light guide, and wherein said light-deflecting means direct said light emerging from said light guide in a substantially radial direction toward said site to be treated.

3. The apparatus of claim 1, wherein said light-deflecting means are designed such that they direct said light emerging from said light guide toward said site to be treated on said wall of the vessel in a fashion distributed uniformly over an entire circumference of said wall of said vessel without rotation of said light guide about its longitudinal axis.

4. The apparatus as claimed of claim 1, wherein said light-deflecting means are designed such that they direct said light emerging from said light guide toward said site to be treated on said wall of said vessel in annular fashion.

5. The apparatus of claim 1, wherein said light-deflecting means are designed as a reflector whose reflecting surface is inclined with respect to a longitudinal axis of said light guide at an angle in the range between 40° and 50°.

6. The apparatus of claim 5, wherein said reflecting surface is designed as a conical surface.

7. The apparatus of claim 1, wherein said light-deflecting means are designed as a reflector whose reflecting surface is inclined with respect to a longitudinal axis of said light guide at an angle in the range between 40° and 50°, and wherein said reflecting surface has a geometry chosen from the group comprising a straight, concavely curved or convexly curved geometry.

8. The apparatus of claim 1, wherein a distal end of said light guide and said light-deflecting means are held immovably relative to one another.

9. The apparatus of claim 1, wherein said light-deflecting means are formed by a distal end of said light guide that is bent approximately at right angles to a longitudinal axis of said light guide.

10. The apparatus of claim 1, wherein said light-feeding instrument is designed as a catheter.

11. The apparatus of claim 10, wherein said catheter has a jacket that encases said light guide and is transparent to said light to be applied, at least in the region of said light-deflecting means.

12. The apparatus of claim 1, wherein a distal end of said light guide and said light-deflecting means are arranged in a tube that connects the two and is transparent to said light to be applied.

13. The apparatus of claim 1, wherein said light-feeding instrument has holding means for fixing said vessel during the application of said light.

14. The apparatus of claim 13, wherein said holding means have a balloon that extends axially beyond a distal end of said light guide and beyond said light-deflecting means and surrounds said light guide and said light-deflecting means.

15. The apparatus of claim 14, wherein said balloon has an elongated geometry chosen from the group comprising a straight or T-shaped geometry.

16. The apparatus of claim 1, wherein said light-feeding instrument has holding means for fixing said vessel during the application of said light, and said holding means have a balloon that extends axially beyond a distal end of said light guide and beyond said light-deflecting means and surrounds said light guide and said light-deflecting means, and wherein said balloon can be dilated.

17. The apparatus of claim 1, wherein said light-feeding instrument has holding means for fixing said vessel during the application of said light, and said holding means have a balloon that extends axially beyond a distal end of said light guide and beyond said light-deflecting means and surrounds said light guide and said light-deflecting means, and said balloon has an elongated geometry chosen from the group comprising a straight or T-shaped geometry.

18. The apparatus of claim 1, wherein said light-feeding instrument has holding means for fixing said vessel during the application of said light, and said holding means have a balloon that extends axially beyond a distal end of said light guide and beyond said light-deflecting means and surrounds said light guide and said light-deflecting means, and wherein an outer side of said balloon consists of a material that does not adhere to biological tissue.

19. The apparatus of claim 1, wherein said light-feeding instrument has holding means for fixing said vessel during the application of said light, and said holding means have a balloon that extends axially beyond a distal end of said light guide and beyond said light-deflecting means and surrounds said light guide and said light-deflecting means, and wherein said balloon is transparent to said light to be applied at least in the region of said light-deflecting means.

20. The apparatus of claim 1, wherein said light-feeding instrument is flexible.

21. The apparatus of claim 1, wherein said light guide has a single optical fiber.

22. The apparatus of claim 1, wherein said light source generates light whose wavelength is in a wavelength range between 780 nm and 2100 nm.

23. The apparatus of claim 1, wherein said light source generates light whose wavelength is chosen from the group comprising the wavelength 808 nm or 2010 nm.

24. The apparatus of claim 1, wherein it can be used for laser welding two vessels to one another.

25. An apparatus for applying light to a site to be treated on a wall of a vessel in the human or animal body, comprising:

- a light-feeding instrument designed to guide light generated by an extracorporeal light source to said site and to radiate said light onto said site;
- said light-feeding instrument comprising

- an elongated light guide that can be inserted into said vessel and can be displaced therein in a longitudinal direction of said vessel; and
- light-deflecting means designed to direct said light fed through said light guide in a substantially radial direction onto said site to be treated;
- wherein said light-deflecting means are designed as a reflector whose reflecting surface is inclined to a longitudinal direction of said light guide, and wherein said reflecting surface is designed such that said light emerging from said light guide is reflected toward said site to be treated on said wall of said vessel in a fashion distributed uniformly over an entire circumference of said wall without rotation of said light guide about its longitudinal axis.

26. The apparatus of claim 25, wherein said light guide is straight at a distal end so that said light emerges substantially axially from said light guide.

27. The apparatus of claim 25, wherein said reflecting surface is designed as a conical surface.

28. The apparatus of claim 25, wherein said reflecting surface is inclined with respect to a longitudinal axis of said light guide at an angle in a range between 40° and 50°.

29. The apparatus of claim 25, wherein said reflecting surface is chosen from the group comprising a straight, concavely curved or convexly curved geometry.

30. The apparatus of claim 25, wherein a distal end of said light guide and said reflector are held immovably relative to one another.

31. The apparatus of claim 25, wherein said light-feeding instrument is designed as a catheter.

32. The apparatus of claim 31, wherein said catheter has a jacket that encases said light guide and is transparent to said light to be applied, at least in the region of said reflector.

33. The apparatus of claim 25, wherein said light-feeding instrument is designed as a catheter, and wherein a distal end of said light guide and said reflector are arranged in a tube that connects the two and is transparent to said light to be applied.

34. The apparatus of claim 25, wherein said light-feeding instrument has holding means for fixing said vessel during the application of said light.

35. The apparatus of claim 34, wherein said holding means have a balloon that extends axially beyond a distal end of said light guide and beyond said light-deflecting means and surrounds said light guide and said light-deflecting means.

36. The apparatus of claim 25, wherein said light-feeding instrument has holding means for fixing said vessel during the application of said light, and said holding means have a balloon that extends axially beyond a distal end of said light guide and beyond said light-deflecting means and surrounds said light guide and said light-deflecting means, and said balloon has an elongated geometry chosen from the group comprising a straight or T-shaped geometry.

37. The apparatus of claim 25, wherein said light-feeding instrument has holding means for fixing said vessel during the application of said light, said holding means have a balloon that extends axially beyond a distal end of said light guide and beyond said light-deflecting means and surrounds said light guide and said light-deflecting means, and wherein said balloon can be dilated.

38. The apparatus of claim 25, wherein said light-feeding instrument has holding means for fixing said vessel during the application of said light, and said holding means have a balloon that extends axially beyond a distal end of said light guide and beyond said light-deflecting means and surrounds said light guide and said light-deflecting means, and said balloon has an elongated geometry chosen from the group comprising a straight or T-shaped geometry.

39. The apparatus of claim 25, wherein said light-feeding instrument has holding means for fixing said vessel during the application of said light, and said holding means have a balloon that extends axially beyond a distal end of said light guide and beyond said light-deflecting means and surrounds said light guide and said light-deflecting means, and wherein said balloon is transparent to said light to be applied at least in the region of said light-deflecting means.

40. The apparatus of claim 25, wherein said light-feeding instrument is flexible.

41. The apparatus of claim 25, wherein said light guide has a single optical fiber.

42. The apparatus of claim 25, wherein said light source generates light whose wavelength is in a wavelength range between 780 nm and 2100 nm.

43. The apparatus of claim 25, wherein said light source generates light whose wavelength is chosen from the group comprising the wavelength 808 nm or 2010 nm.

44. The apparatus of claim 25, wherein it can be used for laser welding two vessels to one another.